Developing Best Practices of Cell Testing for Automotive Lead Batteries

Technical Program Series

Technical Summary

Duration: August 2020 - September 2023

Partners: TU Berlin, Fraunhofer ISC, Moll Batterien, Ford Aachen

Focus: Automotive applications

Objective: Improve laboratory test methods for 2V lead cells to investigate key parameters for automotive applications: high-temperature durability and water loss.

Location: Germany

Work Packages

WP 1 | WP 2 | WP 3

WP1: Setup for high temperature tests of laboratory cells	
ISC	Evaluation of high temperature tests in small laboratory test cells
ISC	Evaluation of test procedures in laboratory test cells
TUB	Evaluation of high temperature tests with commercial EFB batteries
TUB	Relationship between impedance spectroscopy, DCA and water loss
WP2: Influence of cell setup, carbon and lignosulfonate on water loss, high temperature durability and DCA	
ISC	Preparation of negative electrodes with different carbon additives
ISC	Preparation of laboratory test cells
ISC	Electrical tests
TUB	Investigation on dynamic water loss in automotive based cells
WP3: Reporting and status updates (ALL)	

About the Project

The project team aimed to enhance automotive research by improving test methods at the laboratory cell level. They focused on determining high-temperature durability and water loss for 2V cells having Enhanced Flooded Battery (EFB) type configuration. They established correlations between negative electrode formulations and high-temperature behaviour.

The project's main value was gathering results of two parallel sub-projects. These aimed to validate two different sizes of laboratory lead cells: a) small laboratory 2V test cells with 2P1N layout and a nominal capacity of around 4Ah (at ISC), and b) laboratory 2V test cells from Moll Batterien with a 3P2N layout, and commercial sized electrodes, thus having a nominal capacity of around 20 Ah (at TUB).

Results and Applications

Comprehensive Analysis | Performance Evaluation | Practical Implications

Comprehensive Analysis:

The two research institutes, TUB and ISC, implemented, validated, refined and verified their experimental setup and test procedures.

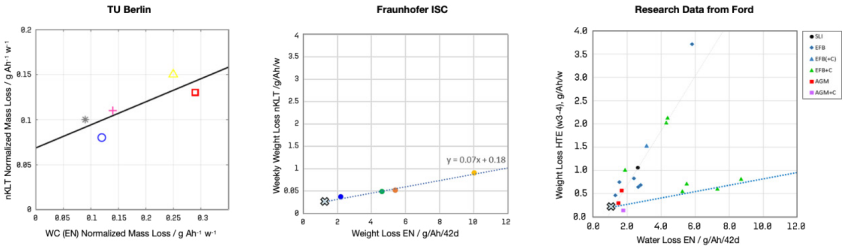

Figure 1: Results from small test cells (2P1N, ISC) match with commercial-sized test cells (3P2N, TUB). 2V cell results correlate with the 12V EFB+C type batteries (data from Ford).

Performance Evaluation:

The project team established best practices for measuring weight loss and high-temperature durability with 2V laboratory cells during standardized tests, and for test cell design and sealing to account for harsh conditions at elevated temperatures. They demonstrated that impedance measurements provide insights into Dynamic Charge Acceptance (DCA) across various cell layouts and additives.

Practical Implications:

This research provided guidance on laboratory cell methodology, showing more realistic results compared to commercial-sized cells and batteries. This is key to optimising active material formulation for automotive battery applications.

Find out more

More information about the technical project and other technical projects of CBI available on our WEBSITE.

Contact Information

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